

## **AUDIT II**

# **Country Report** **SWITZERLAND**

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## **SUMMARY OF ENERGY AUDITING**

The *Decree on Energy Use* (Energienutzungsbeschluss, ENB) of 14 December 1990, the corresponding *Decree on Efficient Energy Use* of 1 May 1991 and the *Federal Energy Law* of January 1999, which replaces the *Decree on Energy Use*, compose the essential legal basis for the current established measures of energy policy at the federal level.

The *Energy Law*, which entered into force on 1 January 1999, embodies the co-operation and subsidiarity principle. Subsidiarity means as well that the Confederation administers only the tasks for which it is better qualified than the cantons or the private organizations. Cooperation means that the Confederation and the Cantons may enlist the services of private organisations (agencies).

The objective of the CO<sub>2</sub> act is to reduce CO<sub>2</sub> emissions by 10 percent in 2010 versus the reference year (1990), combustibles by 15 percent, motor fuels by 8 percent. If this objective is not achieved, the Federal Council may introduce a tax on CO<sub>2</sub>. Energy-intensive industry can acquit itself of the tax by target agreements.

Switzerland energy policy is driven by the SwissEnergy programme. This programme is the follow-up of the previous *Energy 2000 Action Plan* that was in force from 1991 to 2000. SwissEnergy was approved by the Federal Council on 17 January 2001.

The programme serves to enforce the *Energy* and *CO<sub>2</sub> Laws*. The annual budget for SwissEnergy amounts to SF. 55 million.

Since the cantons and municipalities still have major responsibility for energy policy - the Energy Act is a framework act -, they have to implement the SwissEnergy programme and the *Federal Energy Law* for them to become effective and applicable. SwissEnergy thus brings together representatives from all levels and pressure groups.

SwissEnergy's strategy comprises three main components:

- **Voluntary measures**
- **Federal legislation** (Energy Act, Energy Ordinance, CO<sub>2</sub> Act)
- If the various measures do not lead to the targeted results, then in accordance with the CO<sub>2</sub> Act, the Federal Council will introduce a **CO<sub>2</sub> tax** at the earliest in 2004.

SwissEnergy is managed by the Swiss Federal Office of Energy. The implementation of the programme relies on partnerships with the cantons, the industry, consumers' and environmental organisations and with specialized agencies. For each key sector, agencies (i.e. Energy Agency for Industry ) or associations (i.e. MINERGIE and ENERGHIO Associations) have been created to carry out the operational work.

## **Energy Audit Programmes**

There is no stand-alone federal Energy Audit Programme as such in Switzerland. There is one single programme, SwissEnergy, and energy audits are important elements in some sub-programmes of SwissEnergy, including voluntary measures and labelling programmes which are part of it. All activities of SwissEnergy are submitted to an impact analysis every year.

All the programmes and activities described in this report are part of the global SwissEnergy Programme.

## **Programmes with Energy Audits**

### **SwissEnergy for municipalities and the Energy city label**

The municipalities play an important role within SwissEnergy. In the majority of cantons, they are responsible for the implementation of cantonal energy legislation in the buildings sector. They receive support from the cantons in the form of information, consulting and education. However, municipalities often lack the necessary specialized personnel and financial resources, especially for carrying out on-site controls. The SwissEnergy for municipalities and the Energy city label were developed to support the municipal energy policy, to reduce energy consumptions and greenhouse effects gases and to encourage the use of renewable energies. It is a voluntary based programme.

### **Target agreements scheme in industry**

There is an enormous potential for more efficient energy use in trade, industry and services. However, without specific legal obligations or financial incentives, very few companies are willing to enter into binding commitments. Here the potential introduction of a CO<sub>2</sub> tax on fossil energy carriers provides new impulse.

The idea behind target agreements is that companies can be obliged to reduce their energy consumption, and, if they meet the agreed targets, release themselves from an obligation to pay the tax on CO<sub>2</sub>. The Energy Agency for Industry is managing this programme, under the supervision of the SFOE and the SAEFL (Swiss Agency for the Environment, Forest and Landscape).

### **The MINERGIE Programme for buildings**

The MINERGIE Programme is a quality label for new and refurbished buildings. Specific energy consumption and requirements concerning building core shells and mechanical/electrical building infrastructure are used as the main indicators to quantify the required building quality. In this way, a reliable assessment can be assured. Only the final energy consumed is relevant. The MINERGIE Standard is widely accepted. There are many reasons for this, the most important: builders and planners – in other words architects and engineers – have complete freedom both in their design and choice of materials and also in their choice of internal and external building structures. In the meantime, the building sector has developed a wide range of products and services for MINERGIE buildings.

The programme is managed by the MINERGIE Association, which has a performance contract with SwissEnergy.

### **The ENERGH0 programme for public buildings**

The ENERGH0 programme offers a special service aimed at reducing energy consumption in complex public buildings by at least 10 percent in five years, in particular by optimising the operation of systems.

ENERGH0 is an association, and proposes training, exchange of experiences and findings, and advising on energy management optimisation. Subscription to ENERGH0 is done on a voluntary basis, and allows building managers to benefit from these services and to carry out an audit of their building.

## **Other activities including Energy Audits**

The Target agreements with the Association of Swiss Automobile Importers (Auto-Schweiz), signed in February 2002, includes auditing of vehicles. An ordinance is currently in preparation (an energy label) that will apply to new cars.

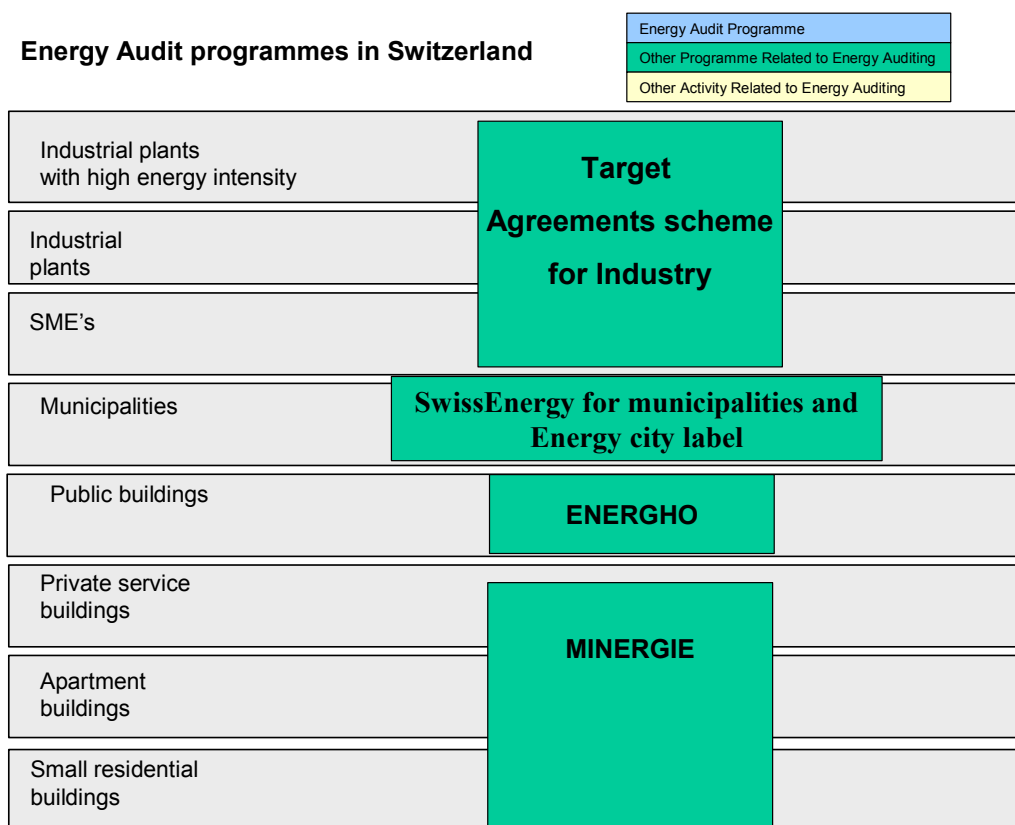


Figure 1: Map of energy audits in Switzerland

*To note: the target agreement with Association of Swiss Automobile Importers is not mentioned on this map because it implies limited audits, and the focus of the report is mainly on buildings and industry .*

Table of EAP features coverage

	<b>SwissEnergy programme</b> (all the programmes mentioned are part of SwissEnergy)
<b>Status</b>	Has been operating since 2001
<b>Administration</b>	Swiss Federal Office of Energy
<b>EA models</b>	+++
<b>Auditors' tools</b>	++
<b>Training, authorisation</b>	++
<b>Quality control</b>	++
<b>Monitoring</b>	+++
<b>Volumes, results</b>	+++
<b>Evaluation</b>	+++

- +++ = Detailed information available
- ++ = Some information available
- + = Very little information available
- = No information available / does not exist

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### Country Report

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### Disclaimer

*The information contained in this report has been gathered from publicly available sources and through interviews. All efforts have been made to secure the veracity of the report, however the authors cannot guarantee the content.*

## THE COUNTRY REPORT

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## 1. Background and Present National Policy

### 1.1. Background

The *Decree on Energy Use* (Energienutzungsbeschluss, ENB) of 14 December 1990, the corresponding *Decree on Efficient Energy Use* of 1 May 1991 and the *Federal Energy Law* of January 1999, which replaces the *Decree on Energy Use*, compose the essential legal basis for the current established measures of energy policy at the federal level.

The *Energy Law*, which entered into force on 1 January 1999, embodies the co-operation and subsidiarity principle. Subsidiarity means as well that the Confederation administers only the tasks for which it is better qualified than the cantons or the private organizations. Cooperation means that the Confederation and the Cantons may enlist the services of private organisations (agencies).

The objective of the *CO<sub>2</sub> act* is to reduce CO<sub>2</sub> emissions by 10 percent in 2010 versus the reference year (1990), combustibles by 15 percent, motor fuels by 8 percent. If this objective is not achieved, the Federal Council may introduce a tax on CO<sub>2</sub>. Energy-intensive industry can acquit itself of the tax by target agreements.

#### Energy 2000

The *Energy 2000 Action Plan* (Federal Council Decree of 6 November 1990) was in force from 1991 to 2000. Its goal was to stabilise the use of fossil fuels (and hence CO<sub>2</sub> emissions) by 2000 and to reduce them thereafter. The electricity consumption should be stabilised from 2000. Its strategy was based mainly on energy efficiency but also on increasing the contribution of non-hydro renewables to electricity generation, raising hydroelectric generation and upgrading the capacity of existing nuclear power plants.

*Energy 2000* was based on the following three principles:

- Voluntary measures for the efficient use of energy and for the use of renewable forms of energy. The implementation of these measures rests with seven “marketing departments”: Public Sector, Residential Buildings, Industry, Small Industries and Services, Hospitals, Motor Fuels and Renewables.
- State framework conditions for a supply of energy that is sufficient, safe and acceptable economically and environmentally, and also for a non-wasteful, efficient use of energy.
- Discussion of controversial themes (e.g. nuclear energy, measures for saving energy) with interest groups and those affected.

Total federal government financing for the *Energy 2000 Action Plan* amounted to SF 558 million for the period 1991-2000, less than what was planned when the plan was launched (SF 170 million per year). Funding aimed mostly at promoting voluntary actions. Around one-third of the funding was dedicated to the promotion of renewables through information, advice, multi-level training, quality guarantees and subsidised installations.

The *Energy 2000 Action Plan* which was limited to ten years ended in 2000. It was replaced by the *Swiss Energy Action Plan* ("SwissEnergy").



## 1.2. Present national policy: SwissEnergy Programme

SwissEnergy was approved by the Federal Council on 17 January 2001, and on 30 January federal councillor and energy Minister Moritz Leuenberger officially launched the programme as a "platform for an intelligent energy policy".

SwissEnergy answers to a constitutional directive (principally CF art. 89 (energy policy), art. 73 (sustainability) and art. 74 (environmental protection)). The programme serves to enforce the *Energy* and *CO2 Laws*. It draws on the experience of the Energy 2000 action programme and represents an uninterrupted extension of this.

The annual budget for SwissEnergy amounts to SF 55 million (it is however threatened with a drastic cutback in the near future).

Since the cantons and municipalities traditionally have major responsibility for energy policy – the *Energy Act* is a framework act -, they have to implement *Energy 2000* programmes, the SwissEnergy plan and the *Federal Energy Law* for them to become effective and applicable. This, and the country's broad, consensus-based approach, requires consultation among all those active in energy markets and policy. SwissEnergy thus brings together representatives from all levels of government, federal, cantonal and local, as well as from utilities, supply companies, industry, consumer groups and environmental organisations.

SwissEnergy's strategy comprises three main components:

- Its primary focus is on **voluntary measures** and agreements with the respective sectors and agencies. The various agreements are to contain jointly defined goals and measures that are binding for all contractual partners.
- On the other hand, **federal legislation** (Energy Act, Energy Ordinance, CO2 Act) calls for (and enables) more comprehensive promotional and legislative measures in the area of energy. In particular, these include regulations governing energy consumption of buildings, motor vehicles and electrical appliances.
- If the various measures do not lead to the targeted results, then in accordance with the CO2 Act, the Federal Council will introduce a **CO<sub>2</sub> tax** at the earliest in 2004.

## 1.3. Organisational structure

The management of SwissEnergy (control, marketing, co-ordination) is the responsibility of the Swiss Federal Office of Energy.

The SwissEnergy Strategy Committee approved in 2001 the programme's marketing and communications plans, labelling strategy and a training/further education concept. It recommended a concentration of effort based on an initial analysis: the Energy Agency for Industry should focus on trade, industry and services, the cantons on buildings with the aid of a buildings agency; and the federal government on transport.

SwissEnergy is a national programme that involves federal government, cantons and municipalities, plus industrial, consumer and environmental associations. Partnerships are decisive for its success. All partners are integrated into the SwissEnergy programme and carry out significant implementation activities.

The programme is divided into 4 sections, as follows:

- **Public sector and buildings:** This primarily concerns activities on the part of the cantons in the building sector (e.g. enforcement of energy legislation, promotion programmes). Its objective is the reduction of CO<sub>2</sub> emissions and, by that, the avoidance of a possible CO<sub>2</sub> tax. The various activities are supported by SwissEnergy for Municipalities (“Energy City” label), the MINERGIE association for widespread implementation of efficient energy use and the use of renewable forms of energy – mainly with the aid of the MINERGIE standard – and “Energho” as partner for efficient energy use in public buildings. Other important partners here are the Agency for Renewable Energies, the SIA (Swiss Association of Engineers and Architects) and Swisscontracting.
- **Industry:** The main activities here are carried out by the Energy Agency for Industry, which brings the various sectors and users into the programme through target agreements. Other agencies (e.g. Swiss Agency for Energy Efficiency, and the Energy Agency for Electrical Appliances) also make an active contribution in the area of electrical appliances.
- **Mobility:** The main objectives here are to improve the energy efficiency of motor vehicles and transport systems (car sharing, etc.) in close co-operation with the federal transport authorities and participants in the “Energy City” programme, and to promote more efficient behaviour on the part of road users.
- **Renewable energies:** The Agency for Renewable Energies and Efficient Energy Use (AEE) has built up a comprehensive network of all interest groups involved in the promotion of renewable forms of energy. It encloses networks specialized on solar energy (Working Community Swissolar), biomass (Working Community Biomasseenergie), wood, wind energy, heat pumps, geothermal energy.

### **Evaluation**

Provisions of the *Energy Act* stipulate that the federal government periodically examine the extent to which the SwissEnergy programme's objectives have been achieved. For this purpose, three separate analyses are carried out:

- An ex-post analysis evaluates the changes in energy consumption and the various factors governing the trend
- An impact analysis examines the impact of the activities of SwissEnergy on energy consumption, employment and the environment
- Detailed evaluations serve to assess the implementation of the various activities of SwissEnergy and their impact correlations.

The objectives are to continue optimising the programme and make it more transparent to the Federal council, Parliament and the general public.

**All the programmes described in this report are or will be evaluated in this framework.**

## **2. Energy Audit Programmes**

There is no stand-alone federal Energy Audit Programme as such in Switzerland. There is one single programme, SwissEnergy, and energy audits are important elements in some sub-programmes of SwissEnergy, including voluntary measures and labelling programmes which are part of this main programme.

All activities of the programme have to be submitted to an impact analysis every year (and further federal subsidies depend on the impact).

## **3. Programmes with Energy Audit**

### **3.1. SwissEnergy for municipalities and the Energy City label**

#### **3.1.1. Programme goals**

Local authorities play a crucial role in the SwissEnergy programme: they have to be exemplary, the objective being that they induce similar positive attitudes in the private sector and the public in the fields on Renewable energies, Transport, etc. SwissEnergy for municipalities has been designed to meet these objectives.

The SwissEnergy for municipalities programme and the related energy city label aim to represent an attractive option for municipalities, allowing them to identify and implement initiatives for energy efficiency and the environment.

In the framework of this programme, the **Energy City label** has been created: this label is attributed to municipalities which implement at least 50% of all feasible measures for energy efficiency improvement in the city. This label may be used as a marketing tool by municipalities.

#### **3.1.2. Target sectors**

SwissEnergy for municipalities targets all municipalities (small towns to large cities).

#### **3.1.3. Administration**

The SwissEnergy for municipalities programme is managed by the SFOE.

In addition, an association called "Association Cité de l'énergie" (Energy City association) is managing the energy city label. All cities that have successfully received the label are part of the association.

Processing of the overall Swiss market is the responsibility of around 40 Energy City consultants acting on behalf of SwissEnergy for municipalities. The SFOE has concluded a service agreement with the latter, according to which the label is to be intensively promoted.

#### **3.1.4. Implementing instruments**

Energy City is not only a label, it is a complete process and starts with an audit. Throughout the certification process, the SwissEnergy advisers support the municipality (specialised advising, exchange of experiences, data transfer, financial support, energy accounting), partly free of charge.

Upon request, the adviser may also provide additional technical support (participation to municipal working groups, etc.), which is then charged to the municipality.

### 3.1.5. Energy Audit Models

At an early stage in the certification process, a first simple audit is carried out to identify the current situation, and the strong and weak points.

The Benchmark model is then used in most cases: with the support of an external consultant authorised by the SwissEnergy programme, the municipality works with a catalogue of measures to study its situation in the fields of:

- Urban planning and buildings
- Energy networks
- Water, water sewage and thermal outputs
- Transport and mobility
- Information and advising
- Internal organisation.

To obtain the Energy City label, municipalities have to commit themselves to implement at least 50% of all feasible energy saving measures.

### 3.1.6. Auditors' Tools

A series of tools called "products" have been developed in the framework of the Energy city programme. Additionally, *SwissEnergy for municipalities* offers a technical support to municipalities.

The tools proposed include:

- The Excel-based BILECO software for municipal energy audit: municipalities enter all their data and the software automatically calculates the continuous evolution of energy consumption and prepares an annual report. The programme covers both private and public sectors of the municipality and analyses general information, energy production, energy consumption, greenhouse gas emissions. The municipality is then able to identify its weak and strong points and to elaborate a strategy.
- The Enercompta tool for energy accounting in buildings
- A catalogue "The ideal energy city" listing best practices and innovative approaches developed by Energy Cities
- Week sessions for Energy saving in municipal buildings
- Training courses for housekeepers
- Ecological purchasing recommendations
- Etc.

### 3.1.7. Training, authorisation and quality control

#### Training and authorisation

Audits are performed either by the advisers of the SwissEnergy programme, or by external auditors that have been authorised by the SFOE.

#### Quality control

The Energy City association is responsible for the quality of the Energy City label.

The quality is evaluated according to the level of implementation of energy efficiency measures. The results of each municipality is compared to those of other municipalities, using a catalogue of standard measures.

### **3.1.8. Monitoring**

The energy city association carries out an audit on a yearly basis in all municipalities having the label, to guarantee the certification. Audits and controls are carried out to check the results and level of implementation of measures.

### **3.1.9. Auditing volumes and results**

In April 2003, 88 municipalities, representing 1.8 million inhabitants, had been certified and received the Energy City label.

### **3.1.10. Evaluation and outlook for the future**

When calculating the overall costs in relation to impact on energy consumption over the full service life, SwissEnergy for municipalities yields the best results (together with other programmes on Transport) of the programme's activities. The Energy City label is currently evaluated: the evaluation focuses on the validity of the benchmark approach and the results should help to improve the audit model.

## **3.2. Target agreements scheme in industry**

### **3.2.1. Programme goals**

The goal of the target agreements programme is to meet the objectives set by the Confederation in the field of industry.

To this purpose, important economic associations created in 1999 the Energy Agency for Industry (Agence de l'énergie pour l'Economie - AenEC). It commits itself to improve energy efficiency and reduce CO<sub>2</sub> emissions. The agency has set its objectives according to the CO<sub>2</sub> Act, which aims to reduce CO<sub>2</sub> emissions in 2010 to 90% of the amount recorded in 1990. If this objective is not reached, the Confederation may introduce a CO<sub>2</sub> tax. Energy-intensive industry may acquit itself of the possible tax by concluding a target agreement with the Confederation to reduce its emissions.

In the framework of this programme, audits are performed in industry.

### **3.2.2. Target sectors**

Target sectors are the sectors of industry, handicraft and services. Meanwhile cantons among others show a lively interest in the agreements, too.

### **3.2.3. Administration**

The programme is managed by the Energy Agency for Industry (Agence de l'énergie pour l'Economie - AenEC), which was created by economic stakeholders in 1999.

The agency has signed a contract with the Confederation setting its commitments towards CO<sub>2</sub> emissions abatement.

### 3.2.4. Implementing instruments

Industries willing to participate in the programme - on a voluntary basis - apply to become a member of the AenEC association. They pay an annual fee depending on the audit model chosen (see "Energy Audit Model").

<b>Industries</b>	<b>Annual fees</b>	<b>Energy Model</b>	<b>Benchmark model</b> (simplified approach)
Small industry (Cost of energy <100 kFr./an)*		-	Fr. 200 to Fr. 500/yr
Medium size industry (Cost of energy 100-200 kFr./an)*		Fr. 4'500/yr	Fr. 1'500 to Fr. 3'000/yr
Large industry (Cost of energy > 200 kFr./an)*		from Fr. 6'000/yr	-

*on average in 2002 SF. 1 = 0,682 euros*

For both models, an agreement and/or a commitment is signed.

The agreement is part of a strategy foreseeing that the legal objectives will be met without having to enforce a CO<sub>2</sub> tax.

The binding commitment would allow industries that have signed it to be exempted from the CO<sub>2</sub> tax: it is therefore more constraining than the agreement.

The data and objectives set in the agreements are controlled by independent auditors and experts and validated by the confederation.

### 3.2.5. Energy Audit Models

The Agency has developed two audit models to take into account the contexts and conditions of small and large energy consumers:

- The energy model, for large consumers
- The benchmark model, for smaller consumers (SMEs mainly).

#### The energy model

The AenEC agency defines a group of 8 to 15 companies after consultation, and the group prepares a target agreement. The companies sign a declaration of intent to confirm their willingness to work together on the set objectives.

The group then carries out the following activities:

- Energy consumption data collection for the past year, and when available, for the year 1990 (reference year)
- Evaluation of the non-influenced evolution of energy consumptions towards 2010
- Rough evaluation of the techniques and energy efficiency measures undertaken in previous years
- Evaluation of energy saving potential, of feasible measures and their impact on energy consumption and CO<sub>2</sub> emissions
- Definition of the target objectives in terms of energy efficiency and CO<sub>2</sub> emissions and of the consequent CO<sub>2</sub> emissions up to 2010.

A moderator from the AenEC agency actively supports the industries during the whole process. It provides appropriate software tools to the group of companies.

### **The benchmark model**

The benchmark model is designed for small companies or handicrafts, which do not employ personnel qualified on energy matters.

As for the energy model, a group is set-up, including 30 to 100 small companies presenting simple production processes and relatively homogeneous products. Energy efficiency and CO<sub>2</sub> emissions levels can be determined through the specific energy consumptions. It is a simplified model, taking into account only specific energy consumptions. Benchmarking is used to determine the objectives.

Two levels of application are considered:

- The simple benchmark model (MBs)
- The advanced benchmark model (MBp)

In this latter model, more focus is put on the follow-up activities.

The AenEC agency moderator collects data from the companies using a questionnaire, tackling the following topics:

- Energy consumption for the past year
- Data on reference units to be considered (depending on the area of activity)
- Data specific to the company (specific equipments, etc.)
- For the advanced benchmark model, some additional data are required (technical equipments, previous energy efficiency measures undertaken, growth rate expected).

The AenEC agency moderator then defines the agreement targets using benchmarking process. The moderator determines on a yearly basis the energy efficiency measures.

### **3.2.6. Auditors' Tools**

Software tools are provided for both models by the AenEC agency. Questionnaires are also used in the benchmark model.

### **3.2.7. Training, authorisation and quality control**

The audits are performed with the technical support of the AenEC.

The AenEC agency provides the companies with a list of authorised energy consultants. The auditors and experts have been trained by means of the confederation.

### **3.2.8. Monitoring**

#### **- Energy model**

A yearly monitoring is carried out during the application phase to check that industries do apply the measures set in the agreement. The AenEC agency provides software tools for the monitoring, which also aims to provide feedback to the company. This monitoring checks the energy consumptions for each type of energy, as well as the energy saving measures implemented and their impact.

#### **- Benchmark model**

A standard check-up is carried out the first year, and then every two years.

### **3.2.9. Auditing volumes and results**

On 2003 first trimester, the AenEC agency collaborated with 46 groups for the energy model and with 19 groups for the benchmark model.

The confederation is going to audit about 40 groups until the end of 2003.

### **3.2.10. Evaluation and outlook for the future**

The target agreement scheme in industry is so far positive: it is estimated that the target agreements signed in 2002 will lead to a 2 million tons of CO<sub>2</sub> emissions reduction. A detailed evaluation of the programme is intended for 2004/05

Objectives for the next two years for the Industry sector:

- Target agreements negotiated by the energy Agency for Industry with a large proportion of companies in the trade, industry and service sectors (at least 40 percent of industrial energy consumption)
- Definition and implementation of a strategy relating to electrical appliances aimed at stabilizing their consumption
- Greater utilization of synergies between electricity research and the electrical appliances market segment
- Expansion of information, consulting and incentive activity with the co-operation of the Swiss Agency for Energy Efficiency and the Energy Agency for Electrical Appliances.

## **3.3. MINERGIE programme for buildings**

### **3.3.1. Programme goals**

Buildings account for approximately 45% of Switzerland's energy consumption (heating oil, gas and electricity). The savings potential (insulation, heating and lighting technologies, "A" appliances) is enormous. So is the potential for the use of renewable forms of energy (wood, solar and ambient heat).

**The MINERGIE standard aims to increase significantly the level of energy efficiency in buildings.**

### **3.3.2. Target sectors**

MINERGIE is a quality label for new and refurbished buildings. This trade name is mutually supported by the Swiss Confederation, the Swiss Cantons along with Trade and Industry and has been registered to prevent misuse. Comfort is the central theme – the comfort of the users living or working in the building. This level of comfort is made possible by high-grade building envelopes and the systematic renewal of air.

Specific energy consumption and requirements concerning building core shells and mechanical/electrical building infrastructure are used as the main indicators to quantify the required building quality. In this way, a reliable assessment can be assured. Only the final energy consumed is relevant.

Therefore, the MINERGIE programme is a good tool to increase energy efficiency in buildings. It implies an audit programme, to allow the attribution of the certification.

As the result of a long-term strategy, based on the consensus of the cantons, the MINERGIE Standard is widely accepted. There are many reasons for this, the most important: builders and planners – in other words architects and engineers – have complete freedom both in their design and choice of materials and also in their choice of internal and external building structures. In the meantime, the building sector has developed a wide range of products and services for MINERGIE buildings. Suppliers include architects and engineers as well as



manufacturers of materials, components and systems. The diversity of this market furthers quality.

### **3.3.3. Administration**

The MINERGIE programme is managed by the AMI (the MINERGIE Association), an association registered in the Swiss Trade Register. A board of management of 11 members (2 of them have having an observer status) looks after operational matters.

In January 2002, the Conference of Cantonal Energy Directors resolved to support the existing MINERGIE association in the form of a federal government service mandate, according to which the MINERGIE association is to further the objectives of SwissEnergy in the buildings segment through the broad promotion of the MINERGIE standard. By 2004 19% of new buildings and 4% of complete refurbishment should be in accordance with the MINERGIE standard.

### **3.3.4. Implementing instruments**

The implementing instrument is the attribution of a label to buildings that comply with the MINERGIE standard.

MINERGIE is a registered trade mark and therefore enjoys complete protection. The MINERGIE label may only be used for buildings that actually meet the MINERGIE standard. Apart from buildings, products and services can conform to MINERGIE standards. The same applies to building modules such as systems, components and materials.

### **3.3.5. Energy Audit Models**

The label is attributed by a process of certification following the requirements of the standards. The certification is carried out by the specialised energy agencies of the cantons (Energiefachstellen) or theses agencies may mandate a private organisation or company to proceed.

The MINERGIE certification is a nonrecurring procedure, which is valid during five years (the label indicates the year of reference). It might be renewed after five years.

### **3.3.6. Training, authorisation and quality control**

The specialised agencies of the cantons either carry out the certification work by themselves, or mandate an external energy auditor, which is therefore authorised to complete the audit.

The training and authorisation of auditors is carried out via the specialised agencies of the cantons.

### **3.3.7. Auditing volumes and results**

More than 100 partnerships were formed with property management companies, and convincing results were achieved with hospitals.

Today, the percent level of compliance with the MINERGIE standard is around 10 percent.

### **3.3.8. Evaluation**

The MINERGIE programme has proved to be one of the most successful programmes of SwissEnergy.

However, a study (Principles for voluntary CO<sub>2</sub> agreements and commitments in the buildings sector) carried out together with the Association of Swiss Home Owners and the Energy Agency for Industry has revealed that, primarily in view of the provisions of the Tenancy Law and CO<sub>2</sub> Act, there are very few incentives for concluding agreements on efficiency targets in order to acquit oneself of a possible tax. Another study (Determining the heating energy requirements of residential buildings) indicated that it is likely to be extremely difficult to achieve the various objectives in this area (-15 percent CO<sub>2</sub> emissions and maximum growth of 5 percent in electricity demand). For example, to meet the declared CO<sub>2</sub> objective it would be necessary to comply with the MINERGIE standard for new construction and renovated buildings in its entirety, as well as continue substituting heating oil with gas.

### **3.4. ENERGH0 programme for public buildings**

#### **3.4.1. Programme goals**

The ENERGH0 programme goal is to achieve a 10% energy saving in complex public buildings over 10 years. A market study pointed out that the largest energy saving potential lies in the large existing complex buildings. The objective is to encourage a transfer of know-how, which is considered as strongly needed in this sector.

ENERGH0's objectives are to:

- train on a continuous basis the buildings managers
- exchange experiences
- manage energy on an optimal way.

ENERGH0 aims to save 200 million SF. per year.

#### **3.4.2. Target sectors**

The programme targets all public buildings with significant energy consumption, administered by the confederation, the cantons or the municipalities.

The key target persons are the buildings technicians and managers.

#### **3.4.3. Administration**

ENERGH0 is an association supported by the Swiss Federal Office of Energy (SFOE). ENERGH0 collaborates with local authorities and public offices and companies to help them achieve significant energy savings in their large complex buildings.

#### **3.4.4. Implementing instruments**

Buildings managers register on a voluntary basis to the ENERGH0 programme. They subscribe to the programme for 5 years: a contract is signed for each building.

Two types of subscriptions are proposed, depending on the size of the building:

- The basic subscription
- The advanced subscription.

<i>Services provided</i>	<b>Performance management</b>	<b>Continuous training</b>	<b>Controlling</b>	<b>Technical assistance</b>	<b>Exchange of experiences, statistics</b>
Advanced subscription	X	X	X	X	X
Basic subscription		X	X	x	X
ENERGHO members					X
Buildings managers		X			X

The subscription cost is made of a set fee to which is added a proportional fee, depending on the building size. Funding of the subscription fee is shared:

- 30 % by the Swiss Federal Office of Energy (SFOE) in the framework of the SwissEnergy programme
- 35 % by local authorities (Confederation, canton, municipality),
- 35 % by the building manager.

The ENERGHO subscription allows the building manager to benefit from a certain number of days of in-situ auditing, depending on the size of the building.

In return, the building manager has to formally agree to:

- Implement the recommended measures
- Participate actively to seminars and exchange of experience
- Collect data on a weekly basis and provide them to the auditor and ENERGHO
- Inform ENERGHO of any changes in the technical characteristics of the building.

A system of funding based on performance has been developed: the building manager keeps 80% of the savings achieved, but the remaining 20% goes to a special "performance fund": ENERGHO redistributes it to the auditors and to the financial partners.

Important to note, when subscribing to the "advanced" option, the building manager gets a formal guarantee that 10% energy saving will be achieved within 5 years as part of the contract.

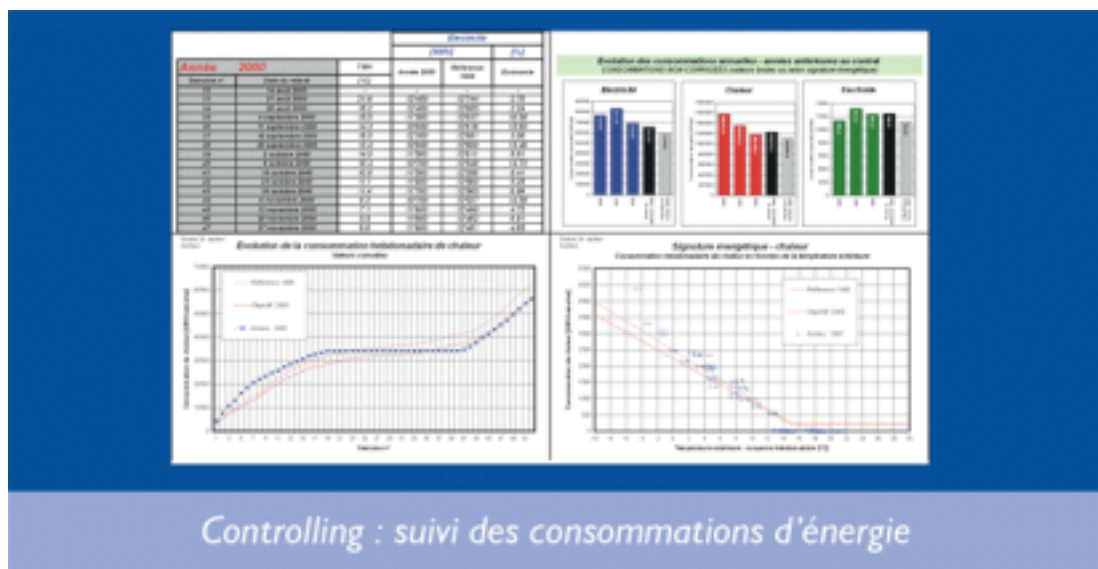
### **3.4.5. Energy Audit Models**

Energy audits are carried out by an authorised auditor, chosen by the building manager on a list provided by the SFOE.

The auditor:

- Identifies the energy saving opportunities
- Elaborates a detailed list of measures to be implemented
- Motivates and assists the technical department in the implementation phase
- Assists the technical department to carry out weekly consumptions measures
- Establishes the building technical sheet, including the description of technical equipments, the list of energy saving measures, energy consumption data.

The weekly measures of energy consumptions are analysed by a software tool designed by ENERGHO, taking into account climatic data (provided on a weekly basis by ENERGHO to the managers).



### 3.4.6. Auditors' Tools

ENERGHO has developed various tools, including:

- Training courses
- Handbooks
- Software tools
- Results monitoring
- In-situ technical support.

### 3.4.7. Training, authorisation and quality control

ENERGHO proposes training courses to auditors.

#### Authorisation

ENERGHO has developed a formal authorisation procedure for auditors to become "ENERGHO Abo engineers". Auditors willing to work as part of the ENERGHO programme must apply to the ENERGHO association and demonstrate their skills: the auditor must have completed at least two successful previous experiences in the field of energy efficiency and buildings optimisation in the past 5 years.

The application forms are analysed by a committee composed of:

- 1 representative of the SFOE
- 3 representatives of the ENERGHO committee
- 1 representative of ENERGHO administration.

The authorisation is valid for 3 years.

The list of authorised auditors is published by the SFOE.

#### Quality control

ENERGHO guarantees the results of the audit and the energy saving.

### **3.4.8. Monitoring**

As for the other sub-programmes, ENERGHO is monitored in the framework of the SwissEnergy monitoring (impact analysis).

### **3.4.9. Auditing volumes and results**

Savings achieved in the first year amounted to 5 percent for heating and 3 percent for electricity.

### **3.4.10. Evaluation**

ENERGHO is one of the programmes of SwissEnergy that yielded to the most notable results (impact analysis). It will presumably be evaluated in detail in 2004.

## **4. Other Activities including Energy Audits**

The Target agreements with the Association of Swiss Automobile Importers (Auto-Schweiz), signed in February 2002, includes auditing of vehicles.

An ordinance is currently in preparation (an energy label) that will apply to new cars.

## **5. References**

### Reference material

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### Swiss Acts

- The *Decree on Energy Use* (Energienutzungsbeschluss, ENB) of 14 December 1990
- The *Decree on Efficient Energy Use* of 1 May 1991
- The *Federal Energy Law* of January 1999
- The *CO2 Law*

Web-sites

- <http://www.energie-schweiz.ch/bfe/en/index.html>
- <http://www.minergie.com>
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- [http://193.246.249.76/energho\\_f/](http://193.246.249.76/energho_f/)
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- <http://www.erneuerbar.ch/f/>
- <http://www.crde.ch/>
- <http://www.misinteractive.ch/?lang=de> (monitoring /controlling tool)
- [http://www.energie-schweiz.ch/bfe/de/information\\_links/broschueren/unterseite27/index.html](http://www.energie-schweiz.ch/bfe/de/information_links/broschueren/unterseite27/index.html)
- <http://www.energie-schweiz.ch/bfe/de/energiepolitik/evaluationen/> (evaluation).

*On average in 2002 SF 1 = 0,682 euros*